Living in the Past

Historical perspective

Inventor of the vacuum tube

In 1904, while working for the Marconi Company in an effort to improve trans-Atlantic radio reception, the British physicist John Ambrose Fleming invented the thermionic vacuum tube. At the time, the device was named the Fleming valve, the word "valve" meaning "vacuum tube" in the UK.

In February 1880, Thomas Edison was investigating the reason for lamp filament breakage and the uneven blackening of his filament terminals. After some experimentation, he discovered that current flowed in one direction, from the filament to the measurement electrode, but not in the other direction. This effect, known as thermionic emission and originally discovered in 1853 by Edmond Becquerel, became known as the *Edison Effect*. Edison himself found little practical use for the effect.

John Fleming discovered that the Edison Effect could be used to detect radio signals. In 1904, he fashioned his own vacuum bulb such that current could only flow in one direction, and called it a ***diode***, because it contained two electrodes, an *anode* and a *cathode*. And because of this unidirectional flow, the British called the device the Fleming valve, for which Fleming applied for, and received a patent. Thus was born the practical vacuum tube, which revolutionized the technology for the first half of the 20th Century. It's believed that the invention of the vacuum tube by John Ambrose Fleming, ushered in the age of electronics.

Later, American engineer Lee de Forest improved on the Fleming valve and invented the triode audion, which again revolutionized electronics and allowed for long-distance telephone, radio communication, and radar. Fleming sued de Forest for infringing on his patent rights, but in 1943, the US Supreme Court not only ruled in de Forest's favor, but actually ruled Fleming's patent invalid.

Still, because the Fleming valve was able to rectify (make positive) AC power into DC power, especially at high voltages, it was used in X-ray machines, TV sets, and amplifiers until the 1970s. Because of his contribution to technology, John Ambrose Fleming was knighted in 1929. In 1933 he was awarded the IEEE Medal of Honor, its highest award, for "the conspicuous part he played in introducing physical and engineering principles into the radio art."